free and open bidding are already prohibited by the anti-trust laws and should be specifically prohibited under the Commission's rules. The Commission should prepare examples of collusive behavior and publicize these examples in a Public Notice for the information of all potential bidders. The Commission should authorize the staff to reject any bid or to withdraw any license from the auction, if collusive bidding is found. The winning bidder should be required to certify at the conclusion of the auction, before the final award of any license, that such bidder has not directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free and open competitive bidding. The penalties should include a full range including license denial, revocation and prohibition of participation in future auctions.

VI. **Application Processing Requirements**

We agree with the Commission's proposal to require only a brief "first stage" application filing in response to a Commission Public Notice of a filing window or cut-off date. This application filing should contain the information and certifications listed in the NPRM (¶ 98). In particular, the Commission should require that the address given on the application be the business office of one or more of the principals of the applicant, not the address of a consultant or agent. Also any applicant filing as a designated entity should be required to make a supplemental showing stating in detail the factual basis for claiming designated bidder status.

With respect to financial qualifications as applied to PCS, we believe that the financial qualifications of an applicant (other than a designated bidder) should be deemed satisfied if the applicant has paid the upfront payment (NPRM, ¶ 102), any additional amounts to cover the required percentage amount of the winning bid (NPRM, ¶ 105) and the remaining amount representing the difference between the winning bid and the deposit. Based upon the Commission's two cents per pop per megahertz formula, the amount of upfront payment involved for PCS licenses will be very substantial e.g. in the case of channel block A or B for New York NY MTA, approximately $15,850,000. If the Congressional Budget Office ("CBO") estimate of sixty cents per pop per megahertz is an accurate prediction of the auction value, the winning bid for the New York MTA would be approximately $475,380,000. In short, the dollars paid into the Treasury are so substantial that obtaining a separate financial commitment is not needed to deter frivolous or fraudulent bidders. A winning bidder who fully pays the amount of the winning bid should be deemed financially qualified. Considering also that the Commission intends to grant PCS licenses conditioned upon such full payment, a separate demonstration of financial qualifications is unnecessary and would unduly burden qualified applicants.

In the case of the applications of designated bidders for channel blocks C and D, the Commission should take a similar approach. The Commission's analysis assumes that the bidding

for the designated bidder channels will not be a true market rate because of limitations upon eligibility to participate. There is good reason to believe that the bidding for these channels may well draw very widespread participation and that for this reason the winning bids for these channels could yield a very high market value relative to other comparable spectrum. We also believe that the availability of installment payment options for these designated bidders will tend to increase the amounts of the winning bids for these channels.

Recognizing the foregoing factors, the Commission does not need to require financial showings beyond the payment of the initial 10 percent of the winning bid as proposed here and the execution of installment payment obligations. With the loss of license as the potential penalty for failure to pay any installment and the application of other unjust enrichment restrictions, the Commission's responsibilities to confirm financial qualifications are adequately met.

VII. **Amount and Timing of Winning Bids**

We support the Commission's tentative conclusion that auction procedures should promote prompt payment by the winning bidder of a "significant and non-refundable sum" so that the auction for the specific license involved can be concluded. (NPRM, ¶ 104). We suggest that the auction winner should only be required initially to pay to the U.S. Treasury 10 percent of the winning bid. Also the time for payment of the additional amount representing the difference between the upfront payment and 10

percent of the winning bid should be up to five business days after concluding the auction for that license. This level of flexibility will be important to permit fair bidding opportunities for moderate sized and smaller companies. Ten percent of the winning bid is by no means a trivial amount and five business days is realistic considering the variable pace of individual auctions and the diverse schedules of the different types of financial institutions potentially involved in funding individual bid payments.

VIII. Other Bid Procedures

In this section, we discuss bid procedures proposed by the Commission which we believe should be revised for practical reasons in the interest of promoting fair and orderly participation in individual auctions.

We support adoption of the Commission's alternative procedures permitting upfront payments to be tendered on the day of the auction as a condition of entry (as described in the NPRM, Fn. 189). "Responsible Officials" should examine, but not collect, any upfront payment tendered by a bidder. Also we propose that the Commission permit use of standby letters of credit by bidders to demonstrate financial resources. A standby letter of credit, like a cashier's check, is a widely used method for confirming the availability of bank assets to guarantee collectability of a payment or series of payments owed to a particular payee. The validity of such a letter of credit can be readily checked so that use of this form of financial showing

will not slow down the review of bidder qualifications on the day of the auction. If the Commission uses third party auditors to verify the fairness and accuracy of auction participation, these auditors should have no difficulty in reviewing the validity of such a letter of credit.

The Commission's "Summary of Proposed Auction Procedures" suggests that a single bidder (or agent) would be permitted to appear at the auction for each applicant. (NPRM, ¶ 171) While we agree there should be an individual designated to make bids for each applicant, the Commission should also allow others (up to a total of five persons including the "bidder") to consult with that designated individual in the auction room to help with bid decisions. Also provision should be made so that bidders and members of their teams can have computers and communications equipment if they so desire. Considering the very substantial dollar amounts of the anticipated bids, the likely variation in market values depending upon incumbent microwave and other factors plus the complex interdependence of geographically and spectrally related licenses, all applicants should have access to the human and other resources necessary to make intelligent bids.

We also suggest that the Commission establish a stopping rule which could be five minutes. That is in a simultaneous auction if no bids have been received for any of the licenses being auctioned for five minutes, that auction is declared over. We also believe that there should be a break lasting a minimum of ten minutes before the next auction in the sequence is commenced.

The Commission should also establish a schedule of minimum bid increments. We suggest a base amount for broadband PCS of $10,000 for all bids under $1 million and increasing amounts above $1 million up to a maximum of $500,000 as follows:

Bid Amount	Increment
$1,000,000-1,999,999	$20,000
2,000,000-2,999,999	40,000
3,000,000-3,999,999	60,000
X,000,000-X,999,999	(.02 x X,000,000)

The use of predesignated bid increments is a well-known and widely used method to encourage orderly bidding and to avoid unnecessarily prolonging the bidding and should be used here.

CONCLUSION

We applaud and support the Commission's efforts to explore numerous alternatives and options for conducting auctions in order to come up with the best mix which meets Congressionally imposed objectives and guidelines. This is unfamiliar subject matter for the Commission and the telecommunications industry. In some respects, spectrum auctions are totally unprecedented so that the Commission cannot rely in all cases upon existing law, policy or governmental experience. The accelerated pace for resolving at least an auction methodology for broadband and narrowband PCS as required under Congressional mandate potentially compounds the Commission's problems in making sustainable decisions.

In our view the best way for the Commission to be able to meet all of the goals and objectives articulated in the NPRM is to adhere closely to methods which will accomplish both the

established goals of the Act and the specific Congressional guidance adopted in the Budget Act. Additional administrative principles should include (1) making sure the auction methodology for broadband PCS is "simple and easy to administer," (2) avoiding "unnecessary complexity in conception or execution, " and (3) minimizing "costs to applicants and the Commission."[11]

We believe that our recommendations adhere to all of the foregoing goals, objectives and principles. We respectfully request that the Commission adopt the procedural approaches described in our comments including the attached statement of Professor Robert J. Weber.

Respectfully submitted,

TELEPHONE AND DATA SYSTEMS, INC.

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November 10, 1993

Its Counsel

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[11] NPRM, ¶ 18.

Comments on FCC 93-455: Notice of Proposed Rule Making:

A Proposed Auction Methodology for the Allocation of PCS Licenses

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November 10, 1993

Comments on FCC 93-455: Notice of Proposed Rule Making

Contents:

1. General considerations

The challenge facing the FCC is to choose a procedure for allocating more than 2500 PCS licenses. This procedure should generate revenues which reflect the fair market value of the licenses being allocated. At the same time, it should minimize the need for secondary-market transactions (which consume resources nonproductively and retard build-out of the licenses) by reaching an efficient allocation resulting in a competitive market which provides good service at fair prices to consumers, and encourages technological innovation. The procedure should also not be biased in favor of some license applicants over others (except to the extent that preferences are intentionally granted).

In choosing how to allocate PCS licenses, the FCC must consider the interests of itself (and the federal government), the consumers and taxpayers it ultimately represents, and applicants in the telecommunications industry. The interests of these constituencies are concurrent with respect to one particular goal: Achieving an economically-efficient allocation of licenses at minimal administrative expense.

An efficient allocation is one which places licenses in the hands of those applicants which can generate the greatest net value from them, where net value is measured as the difference between the benefits accruing to consumers from the provision of services, and the costs incurred by applicants in providing those services. Initial inefficiencies in the allocation of PCS licenses can be corrected through value-creating post-allocation transactions (such as the transfer by sale or trade of a license from one licensee to another). Indeed, as the PCS market develops and new information becomes available to licensees subsequent to the initial allocation of licenses, it is inevitable that some post-allocation transactions will be appropriate. But such transactions entail regulatory, legal, and management costs: The potential need to cover these costs reduces both the initial value of the licenses and the net value created through development of the PCS market. By selling licenses at auction, the FCC can lessen the total cost of economic frictions associated with substantial post-allocation adjustments, and ensure that problems of unjust enrichment do not arise.

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Of course, the net value created from an allocation may be divided among the three constituencies in many different ways. The resource being allocated by the FCC — a useful portion of the electromagnetic spectrum — is in limited supply. Therefore licensees will benefit from a natural limitation on competition, prices to consumers will be somewhat higher than they would be in a perfectly competitive market, and licensees will receive a higher-than-normal return on their direct capital investments. By selling licenses at auction, the FCC will collect (on the taxpayers' behalf) some of the value of the scarce resource being allocated. However, the need to create competitive markets (in order to facilitate technological, service, marketing, and price competition within service regions) makes auction-revenue-maximization an inappropriate absolute first-level priority (since auction revenues alone might well be maximized by selling monopoly rights in each service region or for a nationwide service). Efficiency of the allocation should be the primary objective, and the revenue goal should be based on fair market value instead of on profit maximization.

The nature of current PCS technology suggests that some economies of scale exist, and that these economies are most naturally captured by applicants seeking multiple licenses when those applicants hold groups of geographically-contiguous licenses. To avoid the delays and economic frictions which accompanied the reallocation of cellular service licenses in the post-lottery secondary market, the FCC should employ an auction methodology which facilitates the acquisition of geographically-coherent groups of licenses by some individual applicants. However, different applicants hold different investment, development, and marketing strategies, and differing types of technological expertise, and therefore might disagree on *which* individual licenses or groups of licenses are appropriate for themselves; in addition, some will seek only individual licenses. It is impossible for the FCC to construct appropriate groups which meet the differing concerns of all interested applicants. Indeed, it is impossible to determine with any real accuracy the level of aggregation at which the predominant economies of scale are achieved. It would be far better for the selected auction methodology to permit potential licensees to construct license groups (if they choose to do so) on their own.

2.   Proposal to auction blocks A and B first, blocks C and D next, and blocks E, F, and G last

It has been proposed that seven distinct frequency blocks be licensed for PCS development. Blocks A and B, 30 MHz blocks, will be offered on an MTA-wide basis. Blocks C and D, 20 MHz and 10 MHz blocks respectively, will be offered at the BTA level, with bidders restricted to those qualifying under certain categories of preference. Finally, blocks E, F, and G, 10 MHz blocks, will be offered at the BTA level. No applicant will be allowed to acquire more than 40 MHz of coverage in any area; this guarantees that at least three applicants will hold licenses to provide services in each area.

It is expected that many of the bidders seeking PCS licenses will lack the financial resources necessary to compete for the block-A and block-B licenses in MTAs with the largest population coverage. In addition, many of the smaller auction participants lack the human and informational resources required to estimate the true value of licenses to themselves as accurately as some of the larger participants bidding for the MTA-wide licenses. Finally, the identities of the winners of the MTA-wide licenses, and the nature of the aggregations of licenses across MTAs acquired by those winners, will affect the value of the BTA-level licenses to other bidders. For all of these reasons, it is desirable to conduct the sale of all of the MTA-wide licenses (and announce both the winning bids and the identities of the winners) prior to the sale of the BTA-level licenses. This will facilitate a more efficient allocation of the BTA-level licenses, and at the same time will lead to higher revenues from their sale by levelling the informational playing field and lessening the revenue-suppressing effect of the so-called "Winner's Curse".

The block-A and block-B licenses should all be sold, and the results announced, prior to the sale of the BTA-level licenses.

While there is no reason to object to the simultaneous auctioning of all five BTA-level licenses within any BTA, it is likely that any economically-sensible procedure for carrying out such a sale will prove to be prohibitively

complex, especially if the chosen procedure also provides opportunities to aggregate licenses in some geographically-coherent manner across BTAs. (A procedure allowing such aggregation opportunities will be presented later in this paper.)

If the block-C-and-D licenses are sold separately from the block-E-through-G licenses, then the order of sale becomes an issue which must be resolved. In the interest, once again, of economic efficiency, the block-C-and-D licenses should be offered before the block-E-through-G licenses. If this were not done, bidders granted preferences would face a strategic "guessing game" concerning whether to compete against the bidders not granted preferences, or wait for the later sale of licenses to a more limited group of bidders. If more than two choose to wait, competition for the block-E-through-G licenses will be artificially reduced, lowering the expected selling prices of those licenses and potentially yielding an inefficient allocation.

The block-C and block-D licenses in each BTA should be sold prior to the sale of the block-E-through-G licenses.

3. Selling blocks A and B: Reasons for opposing the offering of nationwide licenses

A critical decision facing the FCC is whether to allow applicants to enter single all-or-nothing "combinatorial" bids for all of the block-A or block-B licenses. Primary arguments in favor of allowing combinatorial bids are that certain economies of scale and provision-of-service advantages can be achieved by a nationwide licensee, and that a nationwide license might therefore draw a higher winning bid than the sum of the winning bids for individual MTA-wide licenses. But a number of issues weigh against these arguments. It is reasoned below that the granting of nationwide licenses could lower total revenues when the subsequent sale of BTA-level licenses is also considered, and that the public interest could be disserved and technological innovation inhibited.

A. Potential for noncompetitive or anticompetitive behavior.

The FCC has already wisely chosen not to grant monopoly rights to any single applicant or consortium. Yet the offering of nationwide licenses at auction raises the possibility of an effectively-noncompetitive market evolving for PCS. If only one nationwide license is awarded, the nationwide licensee will have the ability to focus attacks against specific regional or single-MTA service providers. (Examples of such focused attacks abound in the airline industry, where national carriers have been able to severely damage smaller regional competitors with focused promotional and pricing activities.) Such attacks can serve to force the smaller operators into abandoning direct competition, either by shifting their efforts to less-profitable niche markets or by leaving the PCS market completely.

The mere threat of such attacks can have the same effect. A consequence is that the granting of a nationwide license will lessen the initial value of other licenses (at both the MTA and BTA levels), and therefore could potentially reduce total auction revenues.

Even if two nationwide licenses were awarded, the possibility of a tacit leader/follower relationship between the two licensees could not be ruled out. (Witness the situation in the domestic automobile industry through the middle part of this century.) Again, effective monopolistic behavior results, and consumer interests suffer in terms of both pricing and the provision of service. In addition, there is the possibility that one of the two licensees would focus its primary development efforts on only some of the areas it controls, leaving the other an effective monopolist in the remaining areas.

The experience with cellular service licenses is particularly enlightening. There is a general perception that the largest operators, holding licenses which cover less than 40% of the national population, already have the ability to force other, smaller operators to follow their lead. Although the current proposal for PCS licensing will provide a greater number of licenses in each service area than were offered in cellular service licensing, one can still reason not only that the offering of nationwide licenses is likely to lead to a lack of competitive diversity, but also that a limit on total population coverage by any one bidder is economically appropriate and in the public interest. (Without such a limitation, the potential exists for a total of only three operators — after the aggregation of blocks — to control all of the PCS licenses.)

B.   Likelihood of inefficient license allocation.

At the margin, any economies of scale reaped from a nationwide license would be equally-well reaped from a license excluding a single MTA. And it is unlikely that the inherent value of every single license is greater for the nationwide winner than for any other applicant. This in turn makes it likely that nationwide winners will either keep licenses which are more valuable in the hands of other applicants (an inefficient outcome) or will sell such licenses in post-auction transactions (reaping profits which might otherwise have gone to the government, incurring transactions costs, and delaying build-out).

In addition, the threat of one nationwide 30 MHz block being sold to a single bidder will lessen the amounts that other bidders, lacking the resources to enter a nationwide bid, would be willing to bid for individual or regional licenses on the other 30 MHz block. This in turn decreases the likelihood of individual bids totalling to a high enough amount to top a nationwide bid, even if the individual bidders together value the licenses more highly than a nationwide bidder. (This specific problem is mitigated by the use of an auction procedure which guarantees that individual bids will win only when no nationwide licenses are awarded: Then, bidders for individual licenses can bid on the assumption that no nationwide licensee will exist, knowing that their bids will win only if that assumption is true. A procedure which awards either two nationwide licenses or none would have this property.) And, of course, the existence of one or two nationwide licensees could lessen the value of BTA-level licenses sufficiently to yield total auction revenues below those that would be obtained were nationwide licenses not offered.

At the other extreme, bidders with access to the resources necessary to enter nationwide bids, but which ideally wish to operate regionally, will be forced to compete for nationwide licenses or risk being shut out completely. This again can lead to an inefficient allocation of licenses, requiring substantial post-auction adjustment.

Again, the experience with cellular service licensing is enlightening. The public interest appears to have been served satisfactorily through the existence of a network of regional operators, connected by interoperability agreements. The diversity of providers has produced a wide range of creative marketing approaches, and the trial of a variety of alternative technologies.

C.   Retardation of technological innovation.

PCS technology is still developing. But a nationwide licensee is under relatively little competitive pressure to experiment with alternative new technologies. A primary economy of scale is the adoption of a single technology for service provision throughout an applicant's service areas. The granting of nationwide licenses

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would lessen the variety of technological experimentation, and make less likely the trial of innovative new technologies once the original system is in place. It is not at all clear that establishing this type of scale economy is in the public interest.

D.   Lessened incentives for the development of interoperability standards.

In the cellular area, where initial nationwide licensing was never an issue, connectivity standards quickly (and naturally) evolved. However, a nationwide licensee in the PCS market would be under reduced pressure to work towards the development and acceptance of comparable standards. Indeed, a nationwide licensee could find competitive advantage in operating (and marketing, in terms of subscriber mobility) a closed system.

If no single applicant holds a nationwide license, then all applicants will be under pressure to develop common standards for interoperability across frequency blocks, and for equipment compatibility. The resulting advantages to the public of a more open network architecture are profound.

E.   Lack of corporate focus.

Different markets typically have different needs. For example, the appropriate choice of technology and type of service to be provided to a densely-populated metropolitan region may differ dramatically from that to be provided to a less-densely-populated region. A nationwide licensee will naturally focus its efforts on those markets perceived to be most profitable, to the detriment of other markets also covered by the nationwide license. In contrast, regional or individual MTA licensees will be forced to focus their efforts on the provision of services most appropriate to their specific holdings. (Again, this argues not only against the offering of nationwide licenses, but also in favor of overall population coverage limitations.)

F.   Lack of regulatory comparisons.

If nationwide licenses are granted, then it becomes more difficult to recognize cases where regulatory intervention may be required: Arguments justifying intervention must be based on perceptions of "what might have been". In contrast, if licenses are granted regionally or individually, specific instances for comparison will always be available. (The availability of comparisons makes it easier to detect supracompetitive pricing, inadequate technological development, discrimination, and the like.) Furthermore, of course, the more competitive is the market for PCS provision, the less likely are anticompetitive practices in the first place.

4.   **Proposals for the auctioning of block A and B licenses: Two separate proposals, depending on whether an offering of nationwide licenses will take place**

The points raised in the preceding section lead to a preference ordering of four possible approaches to the allocation of PCS licenses for the 30 MHz (A and B) MTA-wide blocks.

Best: A limitation on the total population coverage acquired by any one applicant or consortium.

No limitation, but no nationwide "combinatorial" bidding.

Nationwide bidding, under rules that guarantee that there will be either two nationwide winners, or none.

Worst: Nationwide bidding, allowing zero, one, or two nationwide licenses to be awarded.

If either of the first two approaches is adopted, then we propose the following procedure for the sale of these licenses:

Order the MTAs from largest to smallest (in terms of population coverage), and conduct a sequence of auctions, dealing with one MTA at a time. Sell the two 30 MHz licenses in each MTA using simultaneous ascending-bid auctions.

If the third approach is adopted, then we propose that the auction be conducted in two stages:

Conduct a preliminary auction of "potential" nationwide licenses. Either (a) accept pairs of sealed bids from each interested bidder, and select the two bids (from distinct bidders, on

distinct blocks) which maximize the total bid amount, or (b) conduct a simultaneous ascending-bid auction of the two blocks.

Announce the potential winning bids, and the identities of the potential winning bidders.

Order the MTAs from largest to smallest (in terms of population coverage), and conduct a sequence of auctions, dealing with one MTA at a time. Sell the two 30 MHz licenses in each MTA using simultaneous ascending-bid auctions. (The high nationwide bidders are allowed to compete in these auctions.)

If the individual bids (across the two blocks, and across all MTAs) sum to more than the total of the two nationwide bids, award all licenses on the basis of the individual bids; otherwise, award both nationwide licenses.

For the fourth (and least-preferable) approach, no proposal is offered here. It appears that every feasible procedure subjects the bidders to strategic "guessing games" which grossly reduce the expected efficiency of the resulting allocation.

Discussion of the proposed auction rules:

A.   Why simultaneous ascending-bid auctions should be used in the auctioning of pairs of licenses.

When participating in a sealed-bid auction (in which the highest bidder is charged the full amount of the highest submitted bid), a bidder is required to make a strategic "guess": How much below the bidder's actual valuation of the item being sold should the submitted bid be? The right guess depends on many factors. How risk-averse is the bidder? How many opposing bidders will there be? How aggressively will those opposing bidders bid? How much objective uncertainty is there concerning the value of the item being sold? The bid-preparation

process therefore requires analysis which reaches far beyond the basic issue of license valuation. And, even if the analysis is carried out correctly, the possibility of "bidder regret" still exists: A bidder, bidding at some discount from its true valuation of the item being sold, may find itself losing to another bid which it would have been willing to top, if given the chance.

An ascending-bid auction, on the other hand, allows a bidder to watch the auction develop, and remain active as long as the price remains below its true valuation; it also allows the bidder to watch the behavior of other participants and draw appropriate conclusions which resolve some of the objective valuation uncertainty before the final price is established. This eliminates the possibility of bidder's regret, while mitigating the price-suppressive effect of the Winner's Curse. (The "Winner's Curse" is the well-known phenomenon which occurs when bidder's face objective valuation uncertainty: The fact that one's bid wins conveys new information — that no other bidder was willing to bid so high — to the winner. This is adverse news concerning the value of the item being sold. In anticipation of this adverse news, each bidder scales back its bids, reducing revenues to the seller.)

The sequential sale of block-A and block-B licenses within a single MTA exposes bidders to another type of strategic guessing game: They must decide, when the first of the two licenses is being sold, whether to continue to compete for that license, or to withdraw from the competition in hope of winning the other license at a more profitable price. Again, the decision requires the analysis of factors quite separate from license evaluation, and an inaccurate analysis can lead to an inefficient allocation of the licenses at prices below those that might otherwise have been achieved. (In this case, bidder's regret arises when a bidder, losing in the second round, finds itself wishing that it had competed more aggressively in the first round.)

A simultaneous sale, on the other hand, allows bidders to shift back and forth between auctions of the two licenses being offered, always competing for the license which currently is available at the more attractive price. Little strategic guessing is required.

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The mechanics of the simultaneous ascending-bid auction of two licenses are simple enough to be carried out "live", by a trained auctioneer. At any moment, two prices are "active", and any bidder which is not currently the high bidder on one license is permitted to top either bid; bidding continues until no-one is willing to top either active bid. An efficient allocation of licenses is likely to result, at prices at least as high as any other auction method might achieve.

B.   Why MTA licenses should be sold sequentially, beginning with the largest (in terms of population coverage) MTAs.

It is likely that the applicants with the largest resources to invest will be the high bidders for licenses covering the largest MTAs. (Some smaller applicants will not be able to afford to compete for even a single MTA-wide block.) The applicants which can afford to acquire several MTA-wide licenses will assign incremental value to licenses covering the largest MTAs due to the potential for acquiring geographically-contiguous MTA-wide licenses as well. And, once a large applicant has acquired a large MTA, the value of contiguous MTAs might be somewhat larger to it than to other competitors. While those competitors will not let the smaller MTAs go at less than individual market prices, the holder of a large adjacent license will be likely to be the high bidder in many cases. Sequential sales, beginning with the largest MTAs, will therefore facilitate regional clustering, while permitting smaller applicants to compete for smaller individual MTAs "between" the regions or for regional groupings they can afford.

This all means that the result of the sequential auction will be likely to be nearly the same as if a much-more-complicated "all-subsets" procedure were used. Furthermore, if the sales within each MTA are conducted using ascending bids, the time required between successive rounds is likely to be smaller than if sealed bids must be submitted in each round (with time allowed between rounds for the review of previous results). (Obviously, the bids entered by a bidder within any one MTA must be allowed to be conditional on the result of previous

sales within other MTAs. Hence, simultaneous sealed-bid sales in multiple MTAs would be very inappropriate.)

C.   (if nationwide "combinatorial" bids are allowed) Why the "potential" nationwide licenses

should be sold first, and the results announced prior to the sale of individual licenses.

If nationwide bids are to be accepted, the results of the nationwide bidding should be announced prior to the

holding of the individual auctions. Theory generally shows that, with more information in the public domain,

higher total revenues can be expected from an auction. (This is the so-called "linkage effect" first presented

by Milgrom and Weber in "A Theory of Auctions and Competitive Bidding", *Econometrica* 50, 1981.)

Furthermore, the individual auctions will only be conducted on a "level playing field" if all bidders know the

status of the nationwide bids before the individual sales take place. Otherwise, applicants not bidding at the

nationwide level will be at an informational disadvantage, and applicants bidding at the nationwide level will

not know whether they are bidding for or against themselves in the individual MTA rounds.

Finally, the announcement of the high nationwide bids eliminates "guessing games" in the individual-license

round, where bidders would otherwise not know whether or not their bids must be raised in order to increase

the chance of topping the combined nationwide bids.

5. Proposal for the auctioning of block C and D licenses

The sale of the BTA-level block-C and block-D licenses involves a number of issues quite different from those which arise in the sale of the MTA-wide block-A and block-B licenses. First, the sale will take place at a time when substantial information concerning the PCS market will already be available: Both the identities of the holders of the MTA-wide licenses and the prices paid for those licenses will be known. Second, the individual BTA-level licenses provide substantially less population coverage than do the MTA-wide licenses. Third, the possibility of block aggregation (into a 30 MHz block) exists. And finally, substantially more licenses must be sold over a limited period of time. In the light of these differences, we propose a set of auction rules quite different from those proposed for the sale of MTA-wide licenses.

In many cases, the aggregation of geographically-contiguous BTA-level licenses will be considered by some applicants to be necessary, in order to permit competition with the holders of the MTA-wide licenses. At the same time, the sheer number of BTA-level licenses to be offered argues against the selling of licenses in sequence.

Therefore, it is proposed here that BTAs be grouped together: A natural grouping would consist of all BTAs contained within a single MTA. (The typical grouping would therefore consist of approximately 10 BTAs.) Then, it is proposed that all aggregations of blocks within each BTA in the grouping be offered for bid. This could easily be accomplished through an electronically-conducted auction, with an information display/bidding board which looks somewhat like the exhibit at the end of this section.

Bidders will be allowed to bid simultaneously on licenses in all of the listed BTAs. In addition, bidders will be allowed to bid either for individual licenses, or jointly for the pair of licenses offered within a BTA. This will permit some bidders (which wish to do so) to guarantee that they will win either both the C and D blocks within a BTA, or neither. Other bidders may guarantee that they will win at most one of the blocks within any

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particular BTA, by never entering a combined bid, and by never topping the bid for one of the two blocks when they currently stand as the high bidder for the other block.

At any point in time, either the current high bids on the two separate blocks within a BTA will total to more than the high bid for the combination of both blocks, or the combined bid will top the sum of the individual bids. To simply the following discussion, we refer to the individual bids as being "active" in the first case, and the combined two-block bid as being "active" in the second case.

A bidder will be allowed to top any bid, including its own; in addition, if a bidder's bid is not currently "active", the bidder will be permitted to withdraw that bid. (This is necessary, in order to allow a bidder with limited resources to abandon its quest for a license in one BTA, and begin bidding for a license in another BTA instead. If bids could not be withdrawn, a bidder for a single license could find its currently-inactive bid becoming active again, were the bid for the other single license in the same BTA to be raised sufficiently high.) If a bid is withdrawn, the previous high bid takes its place (and remains, for the time being, inactive); it, too, can of course be withdrawn.

The auction will end when a pre-announced amount of time (e.g., five minutes) passes with no increase in the sum of the active bids.

Note that the amount of information which must be assimilated by a bidder during the bidding is not prohibitively complex. The use of a minimum bid increment will likely be necessary in order to move the auction expeditiously to its conclusion. Such a minimum bid increment could be either a fixed dollar amount, or a percentage increment over the bid being topped.

A bit of a free-rider problem exists in the proposed method: Two applicants, currently the high bidders on the two single licenses within a BTA, facing an active bid for the combination of licenses, could find themselves

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